



Modern Technology Transforming Virtuosos Into Conductors

Charles A. Harris
Senior Software Engineer
The Boeing Company
Charles.a.harris2@boeing.com



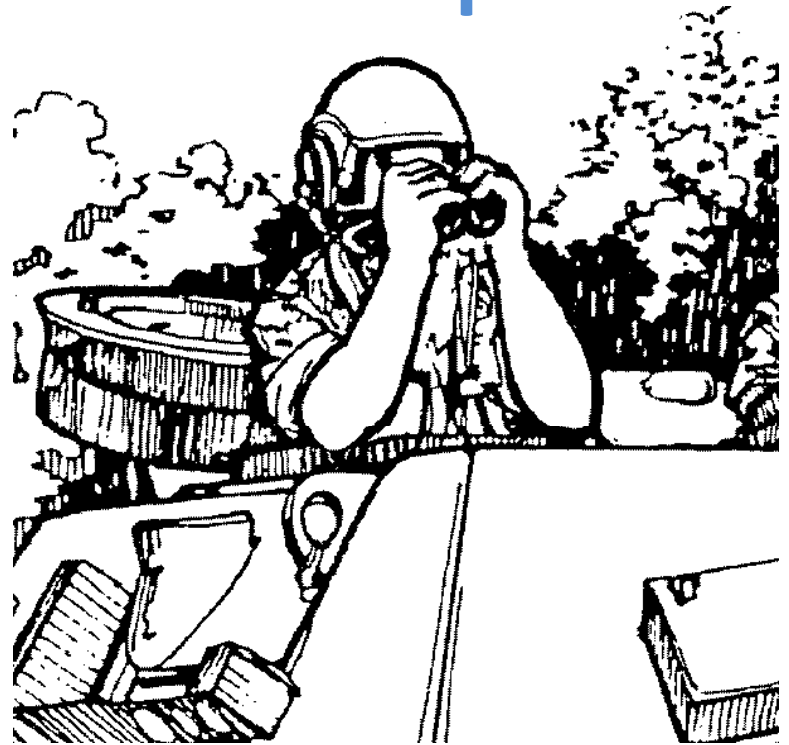
Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE APR 2010		2. REPORT TYPE		3. DATES COVERED 00-00-2010 to 00-00-2010	
4. TITLE AND SUBTITLE Modern Technology Transforming Virtuosos Into Conductors				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) The Boeing Company,100 North Riverside,Chicago,IL,60606				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES Presented at the 22nd Systems and Software Technology Conference (SSTC), 26-29 April 2010, Salt Lake City, UT. Sponsored in part by the USAF. U.S. Government or Federal Rights License					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 42	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



Virtuoso

a person who has special
knowledge or
skill in a field

<http://dictionary.reference.com/browse/virtuoso>





A Conductor

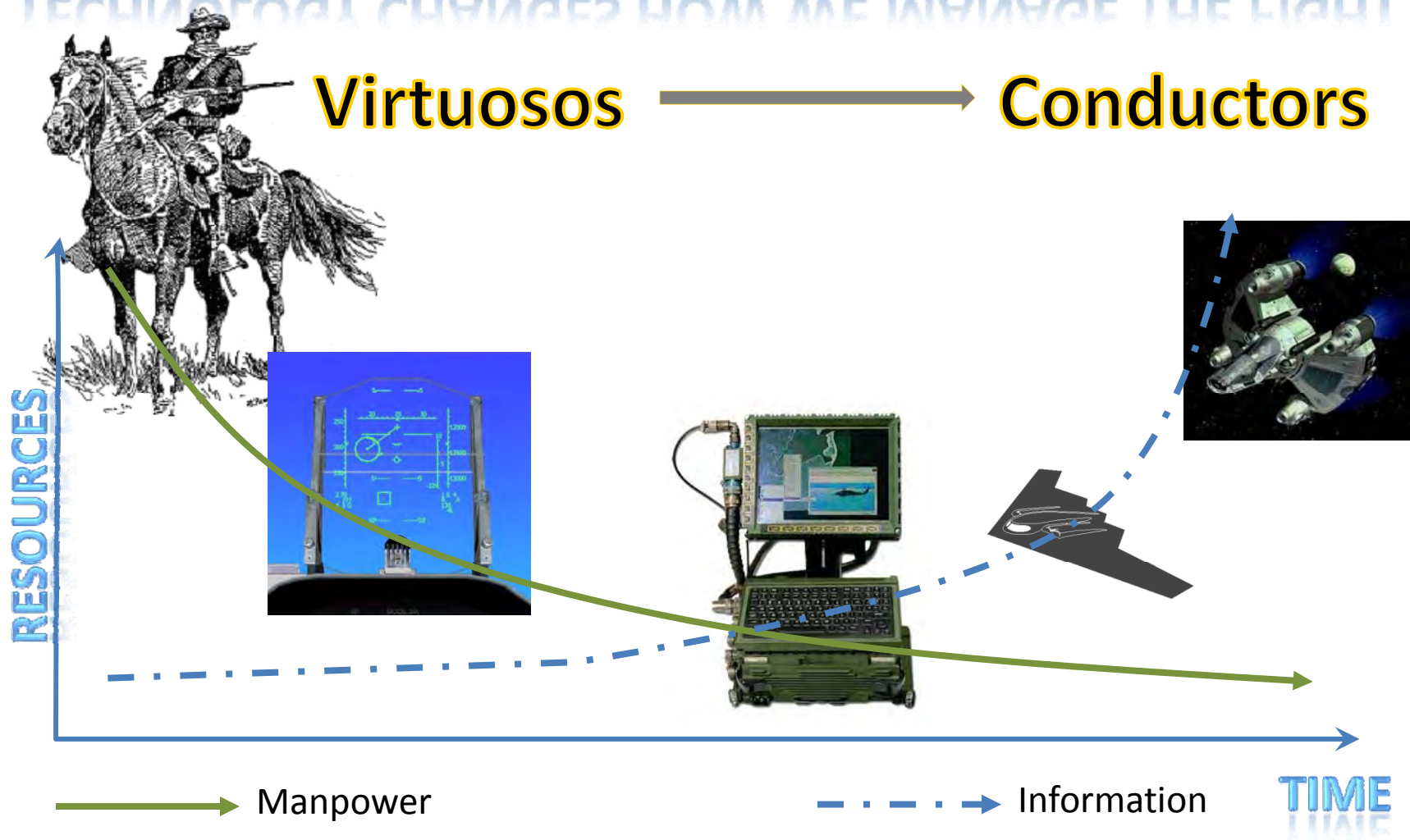
a person who conducts;

a leader, guide,
director, or
manager.



**ONE WHO MARSHALLS MANY RESOURCES TO
ACCOMPLISH THE MISSION AT HAND.**

TECHNOLOGY CHANGES HOW WE MANAGE THE FIGHT



**Technology enables the production and delivery of information;
making it possible to do more with less in less.**

Common Attributes of Tactical Information

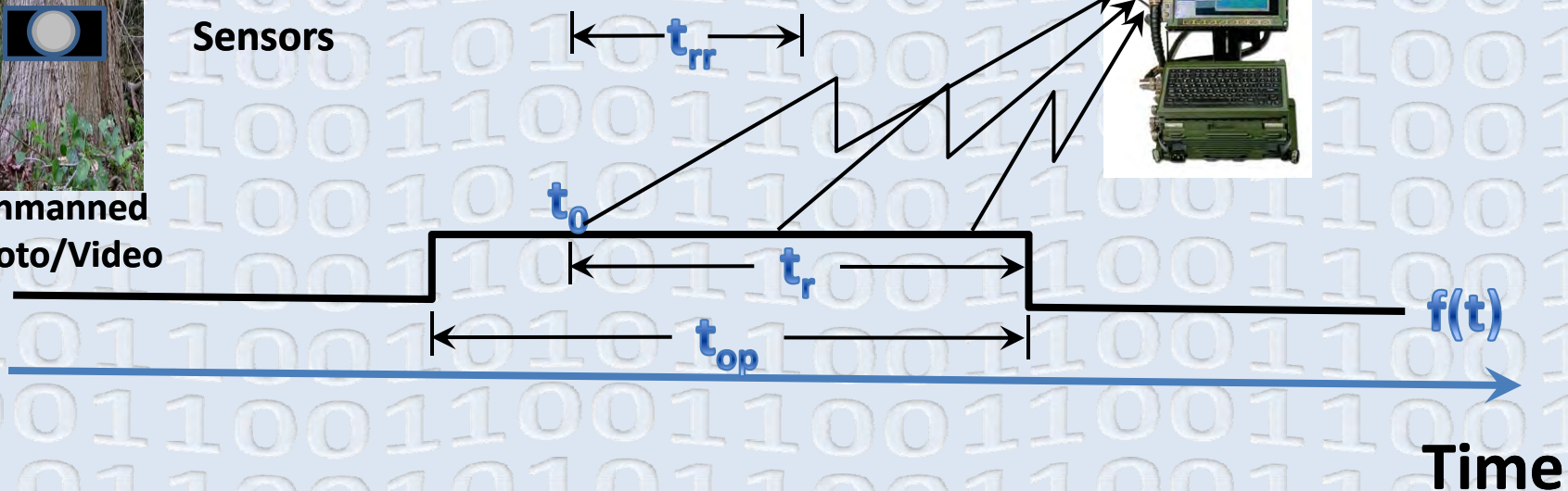
1. Time of Acquisition (t_0)
2. React Time (t_r)
3. Opportunity Time (t_{op})
4. Life Cycle $f(t)$
5. Type
 - a) Current Intelligence
 - b) Target Intelligence
 - c) Common Operational Picture (COP)
 - d) etc
6. Refresh Rate (t_{rr})
7. Source
 - a) Credible
 - b) Questionable
 - c) Unknown
 - d) etc
8. Relative Value

$F(t)$ t_{op} t_0 t_{rr}

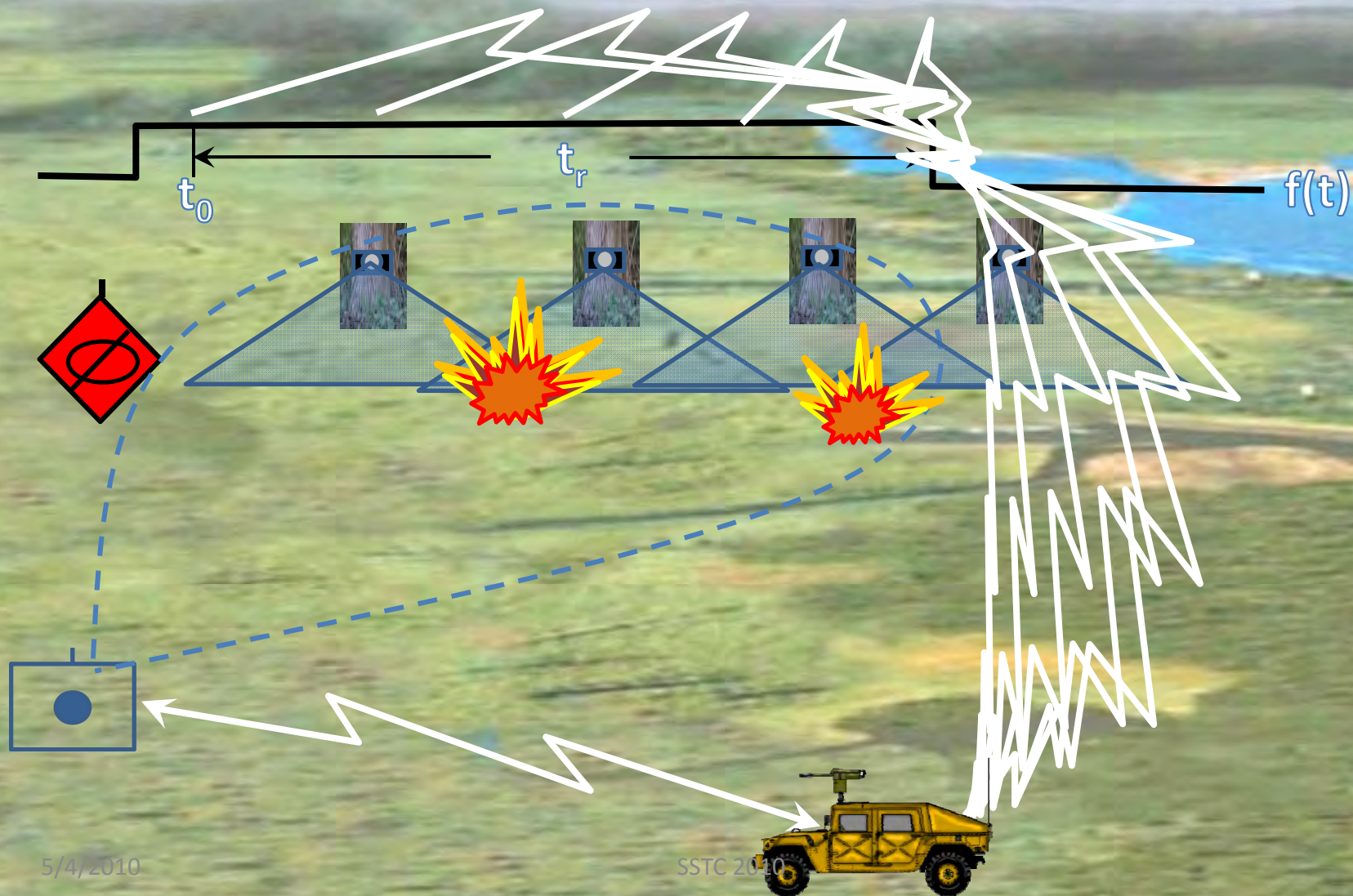


Sensors

Unmanned
Photo/Video

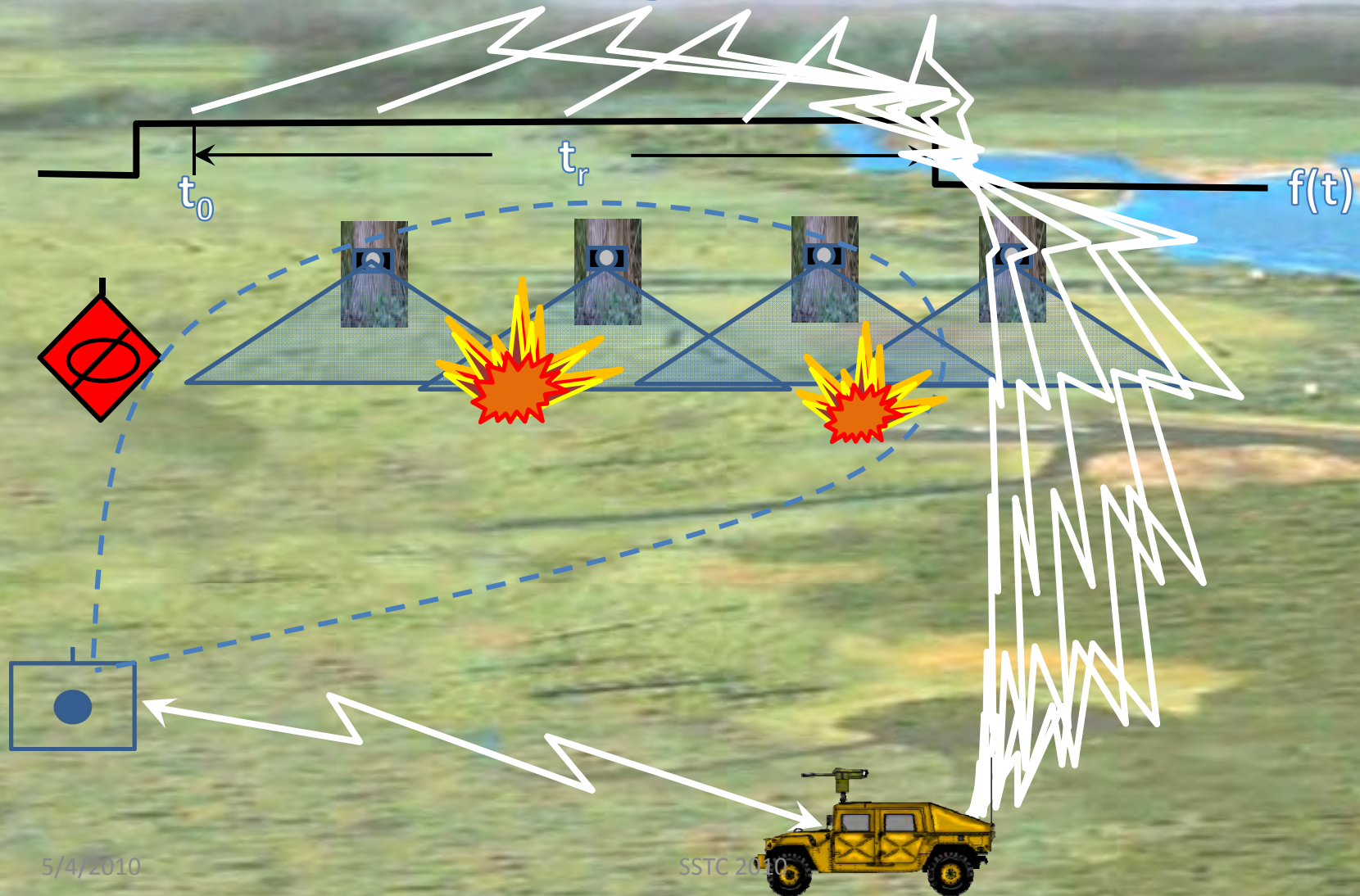


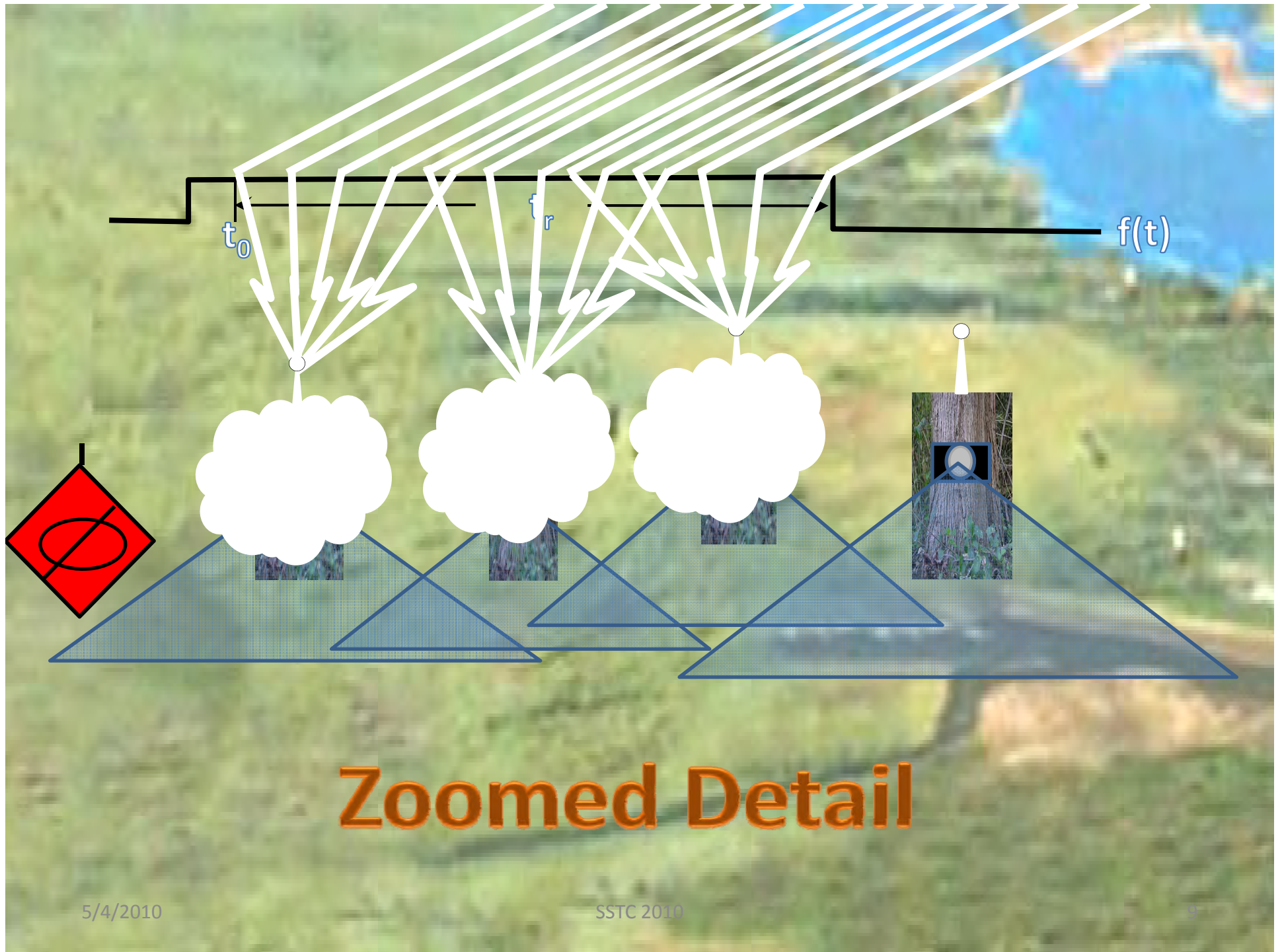
A Simple Example

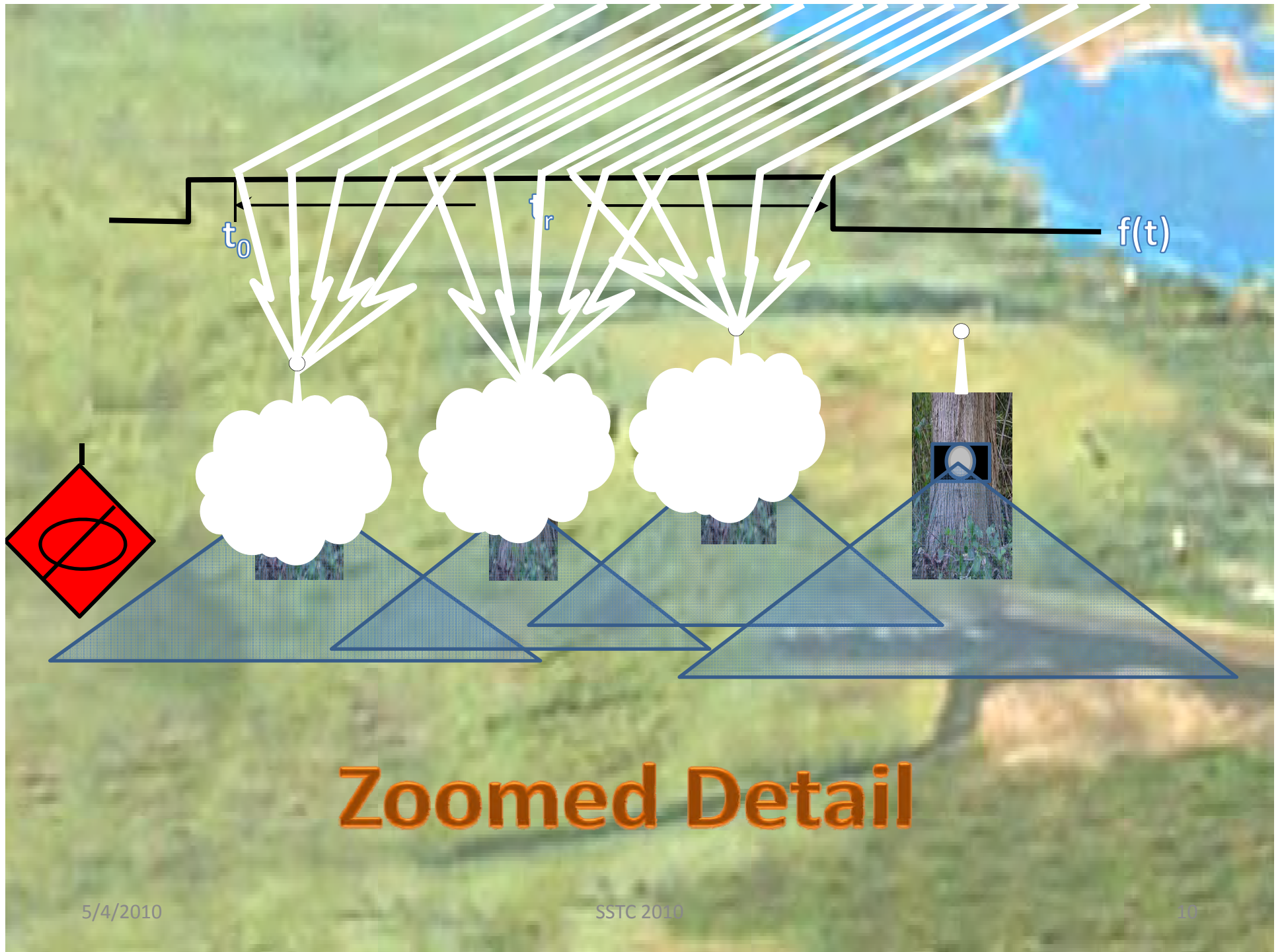


A Simple Example

Stop Action





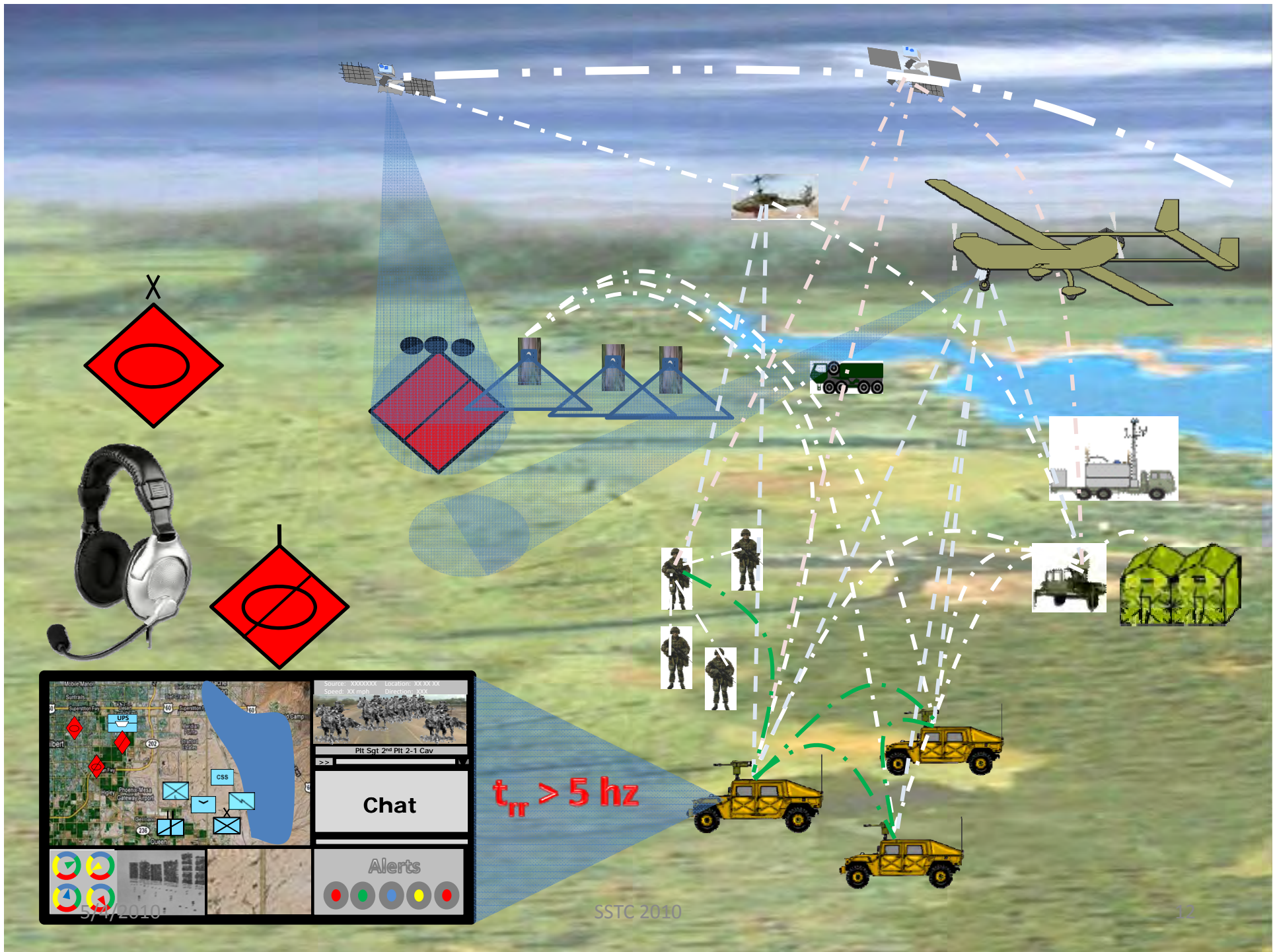


Key Points So Far

It is no longer sufficient for a warfighter to be a weapon system operator

- Must be able to operate weapon system
- Must be able to communicate with other combat team members
- Must be able to interpret and act on near real time (small t_{rr}) information feed

Not:
collect,
report,
wait for direction,
execute





Operate Primary Weapon(s)
Role Skills & Craft
Imagery Interpreter (still & video)
Real Time Δ Image Interpreter

Multi – Tasker (voice, visual, text, audio)
Information Evaluator

– source, t_r , t_{rr} , t_{op} , $f(t)$, priority
Execution Timing



Operate Primary Weapon(s)
Role Skills & Craft



SSTC 2010



In Closing

- Resources have increased:
 - ✓ Multiple Sensor Sources
 - ✓ Information I/O
 - ✓ Collaboration
 - ✓ Warfighter is enabled to do more with less
- Important Points
 - ✓ Not all Information is created equal
 - ✓ Seeing is not necessarily believing
 - ✓ Sensors don't always talk to one another before reporting
 - ✓ Information Overload is a killer in the battlespace
 - ❖ Inhibits decisiveness
 - ❖ Overwhelms the receiver
 - ❖ Jeopardizes the mission
- Don't discount fantasy/Science Fiction
 - Jules Vern - Nuke Subs
 - Robert Heinlein – Starship Troopers
 - George Lucas – Star Wars

In Closing



5/4/2010

SSTC 2010

15